



2017/18 Mussel Monitoring Survey

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Mussel Monitoring Status & Trends Objectives:

Status:

Characterize the spatial extent of contamination to which nearshore biota residing inside the UGA sampling frame may be exposed, using mussels (*Mytilus* sp.) as the primary indicator organism. (answered each year)

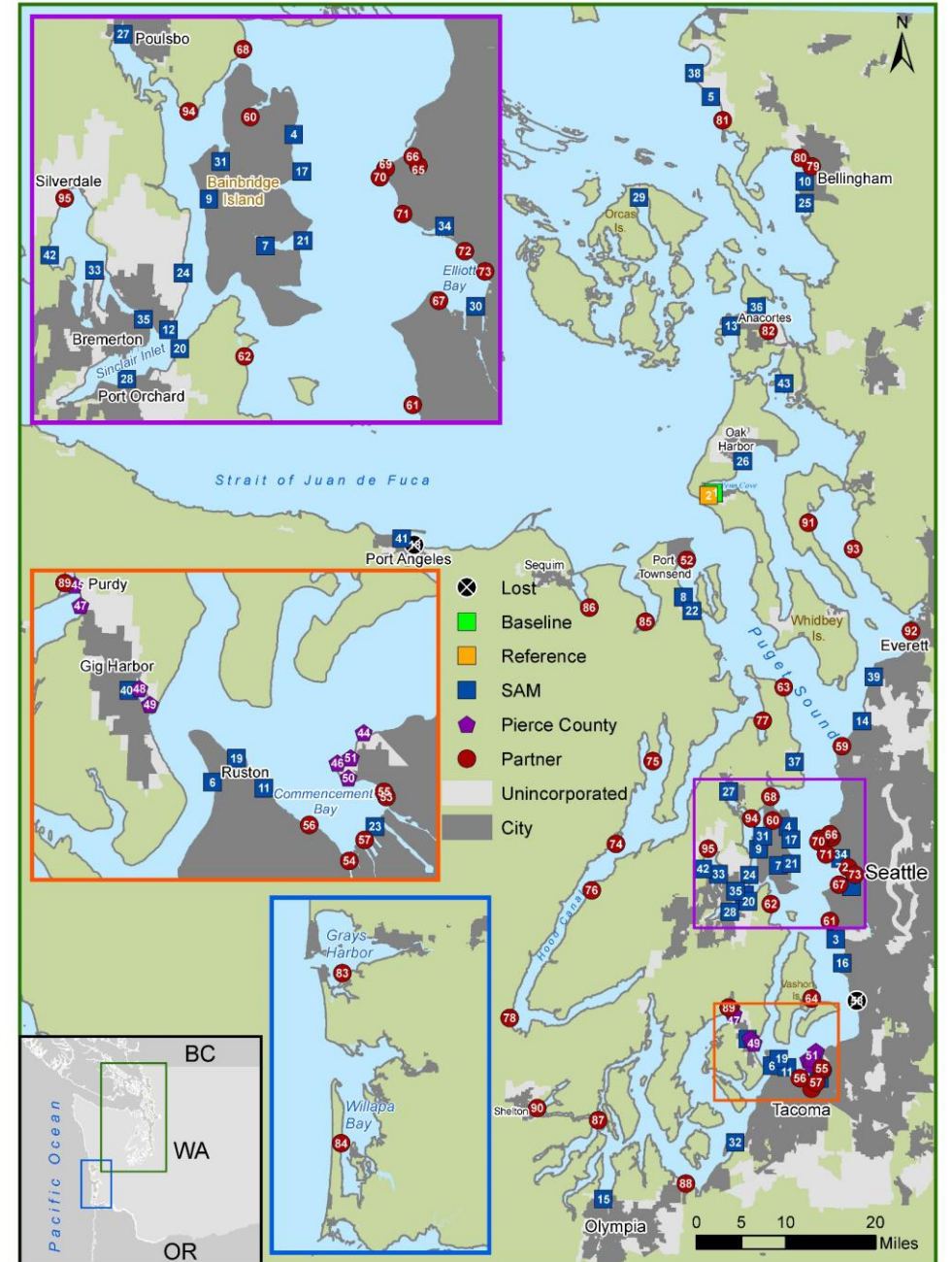
- detection frequency and concentration range of contaminants
- spatial extent of key contaminants present inside the UGA sampling frame
- geographic range of contaminants
- examine the relationship between land-use and the movement of contaminants from terrestrial sources to the Puget Sound nearshore

Trends:

Track changes in mussel tissue contamination over time inside the UGA sampling frame to determine if the health of the biota in the urban nearshore is improving, deteriorating, or remaining the same related to stormwater management and urban population growth in Puget Sound. (*answered over time*)

2017/18 Mussel Monitoring Sites:

- 92 total sites: 40 SAM + 1 SAM reference, 8 Pierce County, and 43 Partner
- Native bay mussels (*Mytilus trossulus*)
- Transplanted in anti-predator cages to nearshore
- Winter exposure for 3 months



Mussel cages
deployed &
retrieved by
100+ volunteers



Chemical Analyses

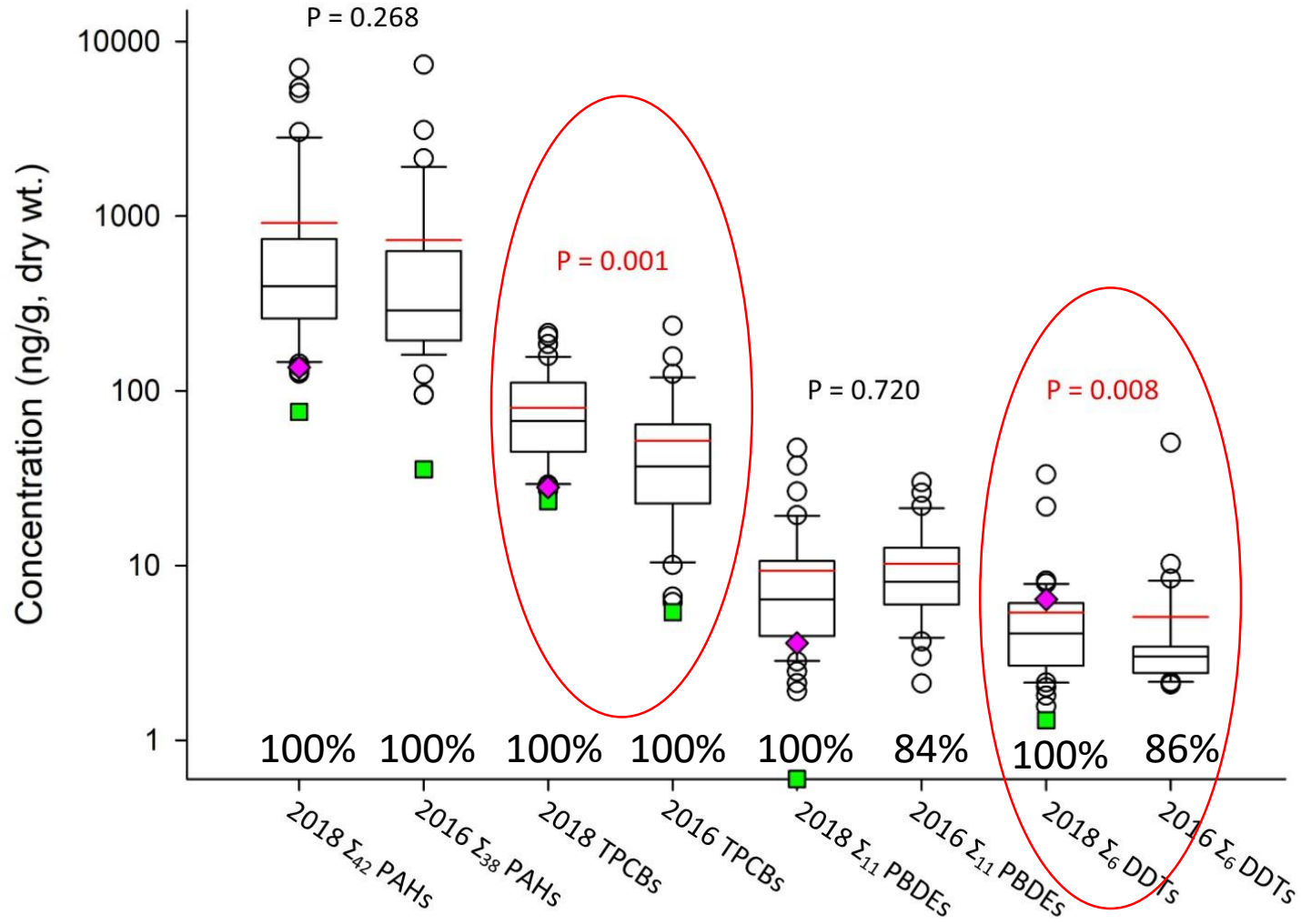
- **Organic contaminants:**

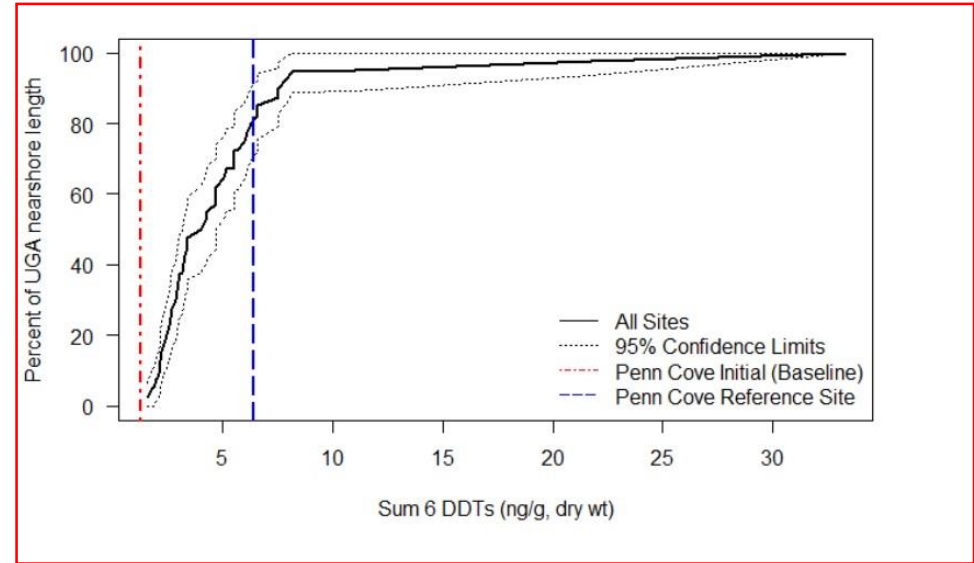
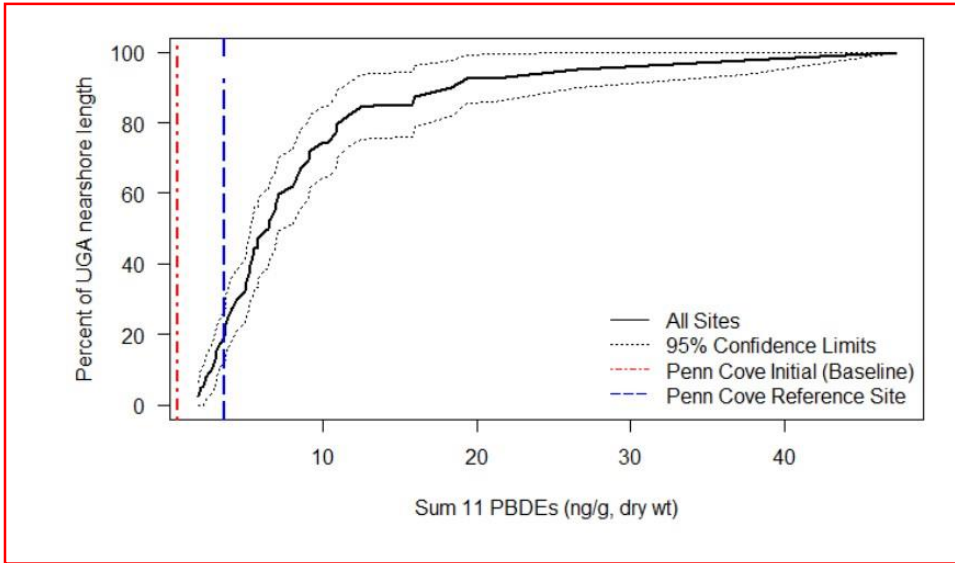
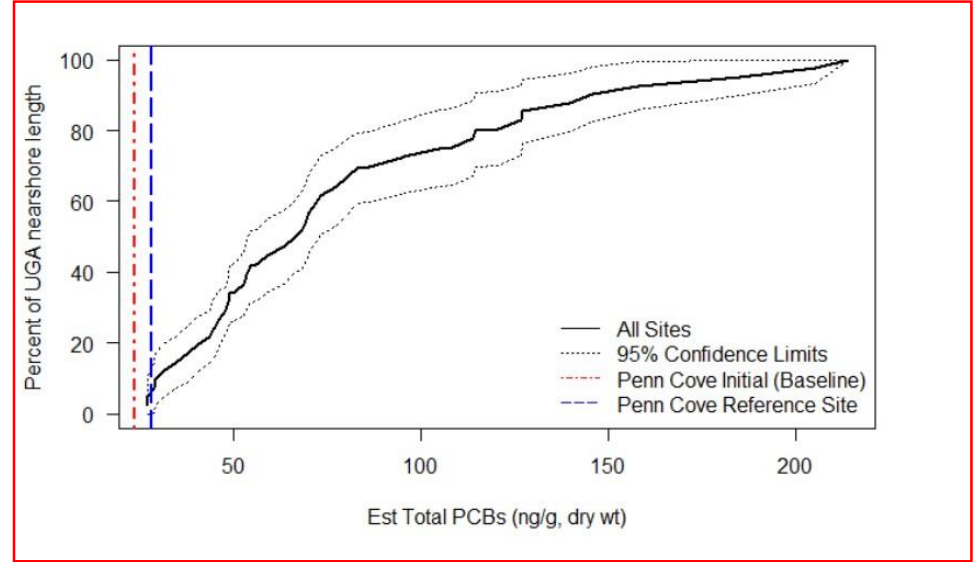
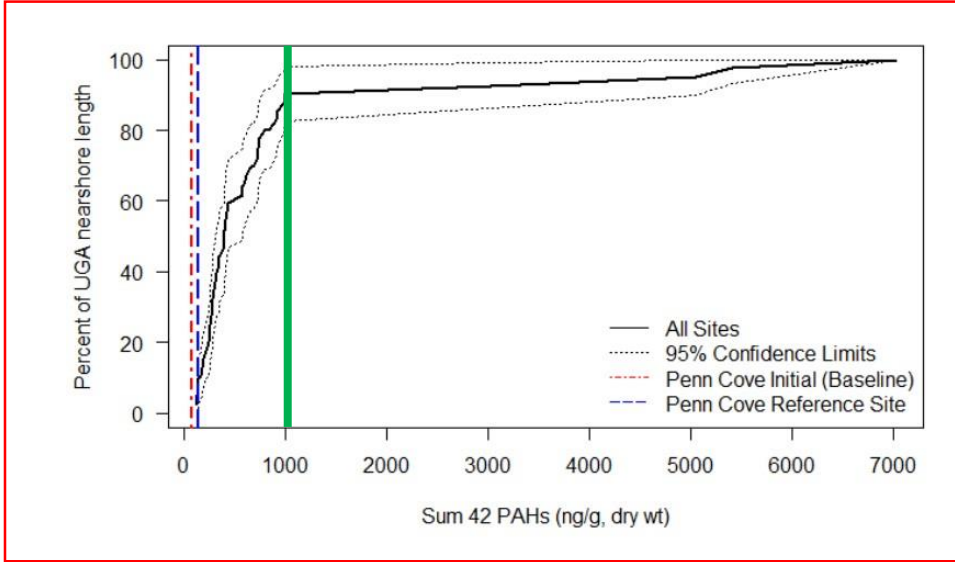
- **PAHs** - Polycyclic Aromatic Hydrocarbons
- **PCBs** - Polychlorinated biphenyls
- **PBDEs** - Polybrominated diphenylethers
- **DDTs** - Dichloro-diphenyl-trichloroethanes
- Other pesticides - chlordanes, HCB, aldrin, dieldrin, HCHs, endosulfan 1, Mirex

- **Metals:**

- Arsenic, Cadmium, Copper, Lead, Mercury, Zinc







PAH Concentration Categories by Percentile

Low: 25th Percentile, ≤ 179 ng/g dry wt.

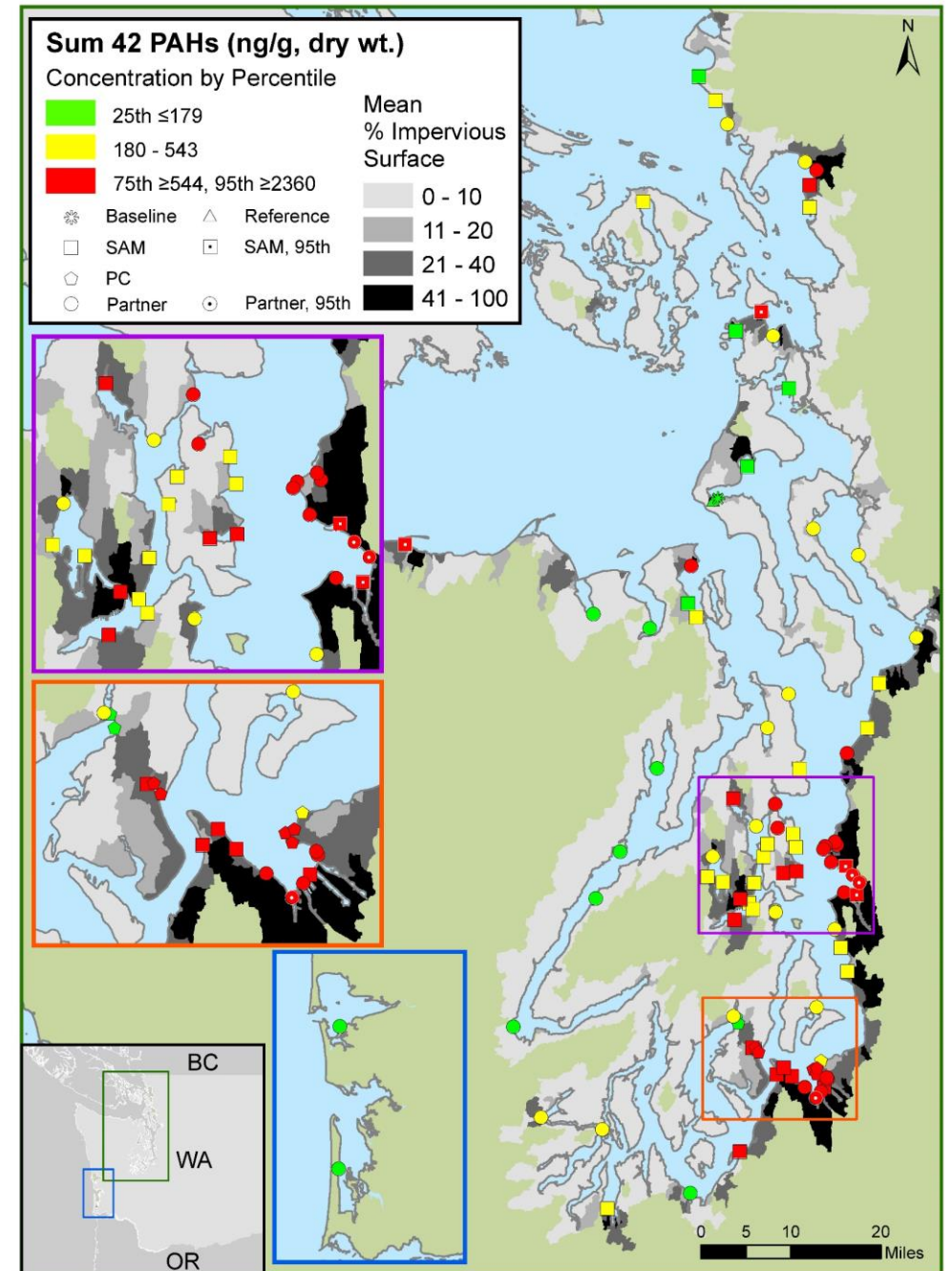
Intermediate: IQR, 180 - 543

High: 75th Percentile, ≥ 544

Highest: 95th Percentile, ≥ 2360

PAHs highest in urbanized/industrialized south-central Puget Sound Basin; Elliott Bay, Eagle Harbor, Sinclair Inlet, Commencement Bay, Gig Harbor.

Also, high at Port Angeles, Port Townsend, Anacortes, and Bellingham Bay areas.



PCB Concentration Categories by Percentile

Low: 25th Percentile, ≤ 18.7 ng/g dry wt.

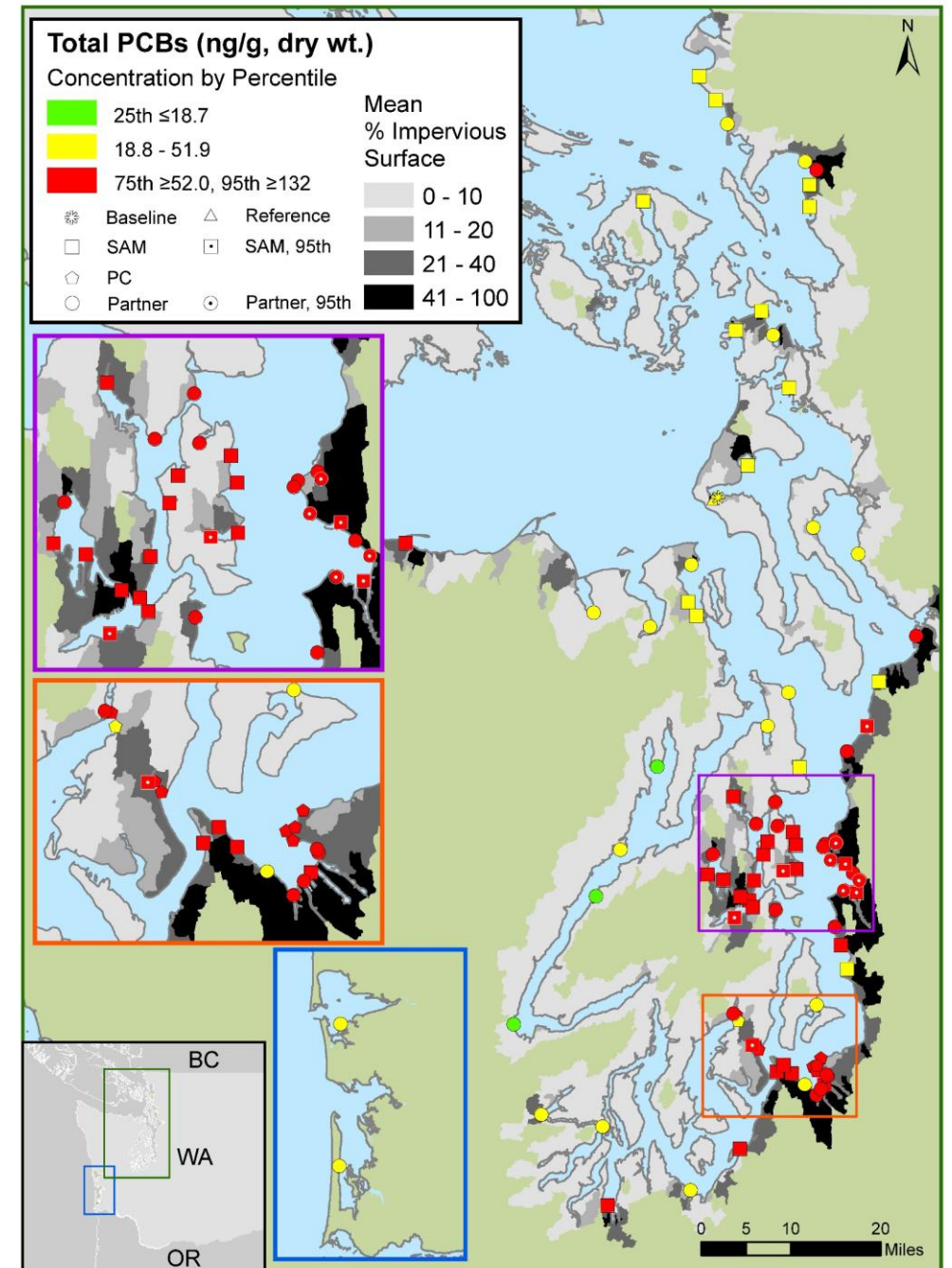
Intermediate: IQR, 18.8 - 51.9

High: 75th Percentile, ≥ 52.0

Highest: 95th Percentile, ≥ 132

PCB concentrations high throughout urbanized/industrialized south-central Puget Sound Basin; highest at Elliott/Salmon Bay, Eagle Harbor, Sinclair Inlet, Gig Harbor.

Also elevated near Port Angeles, Bellingham, Edmonds, and Olympia/Budd Inlet areas.



PBDE Concentration Categories by Percentile

Low: 25th Percentile, ≤ 3.06 ng/g dry wt.

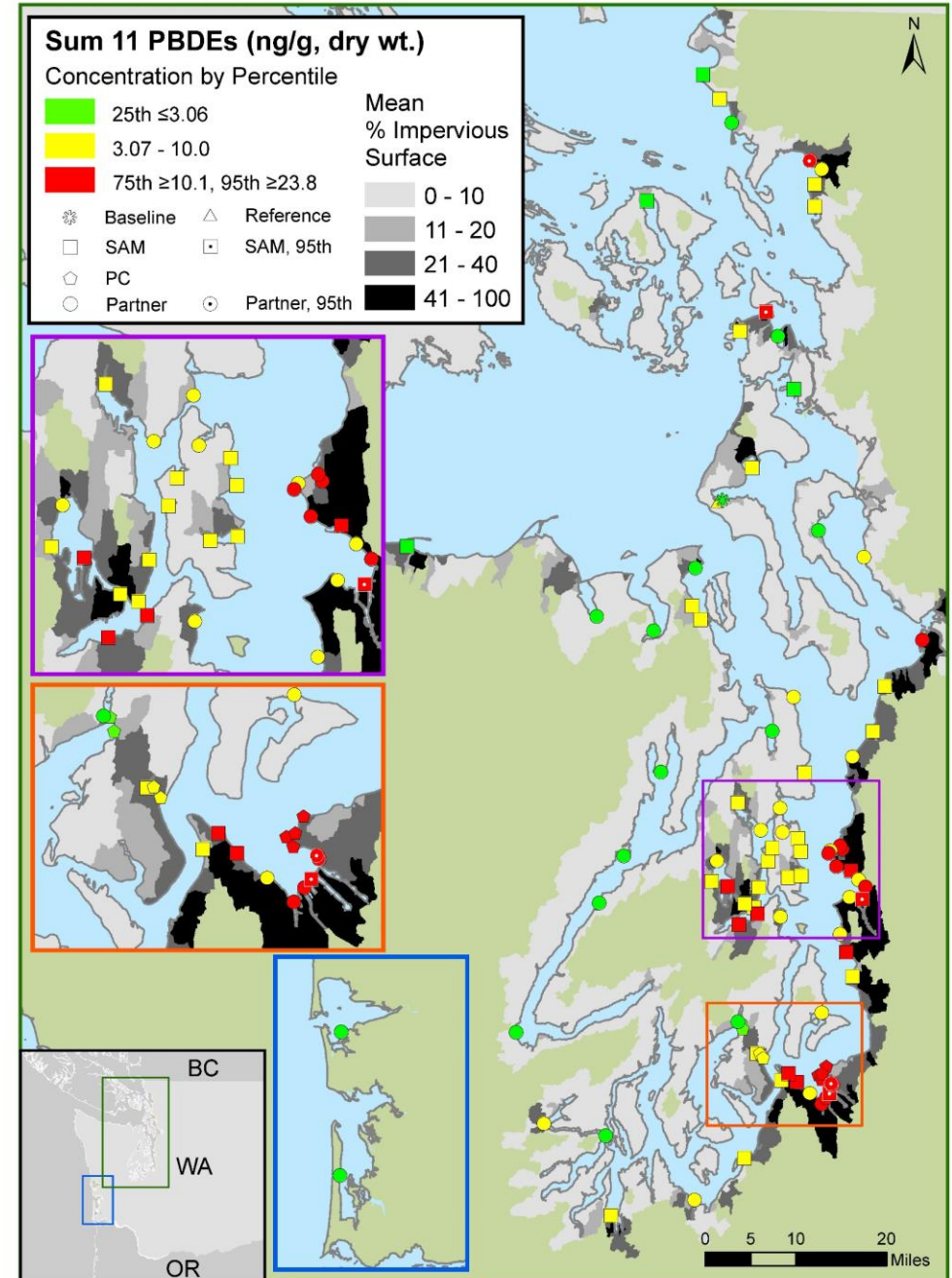
Intermediate: IQR, 3.07 – 10.0

High: 75th Percentile, ≥ 10.1

Highest: 95th Percentile, ≥ 23.8

PBDE concentrations highest in urbanized/industrialized south-central Puget Sound Basin; Elliott Bay, Sinclair Inlet and Commencement Bay.

Also elevated near Bellingham and Anacortes areas.



DDT Concentration Categories by Percentile

Low: 25th Percentile, ≤ 1.98 ng/g dry wt.

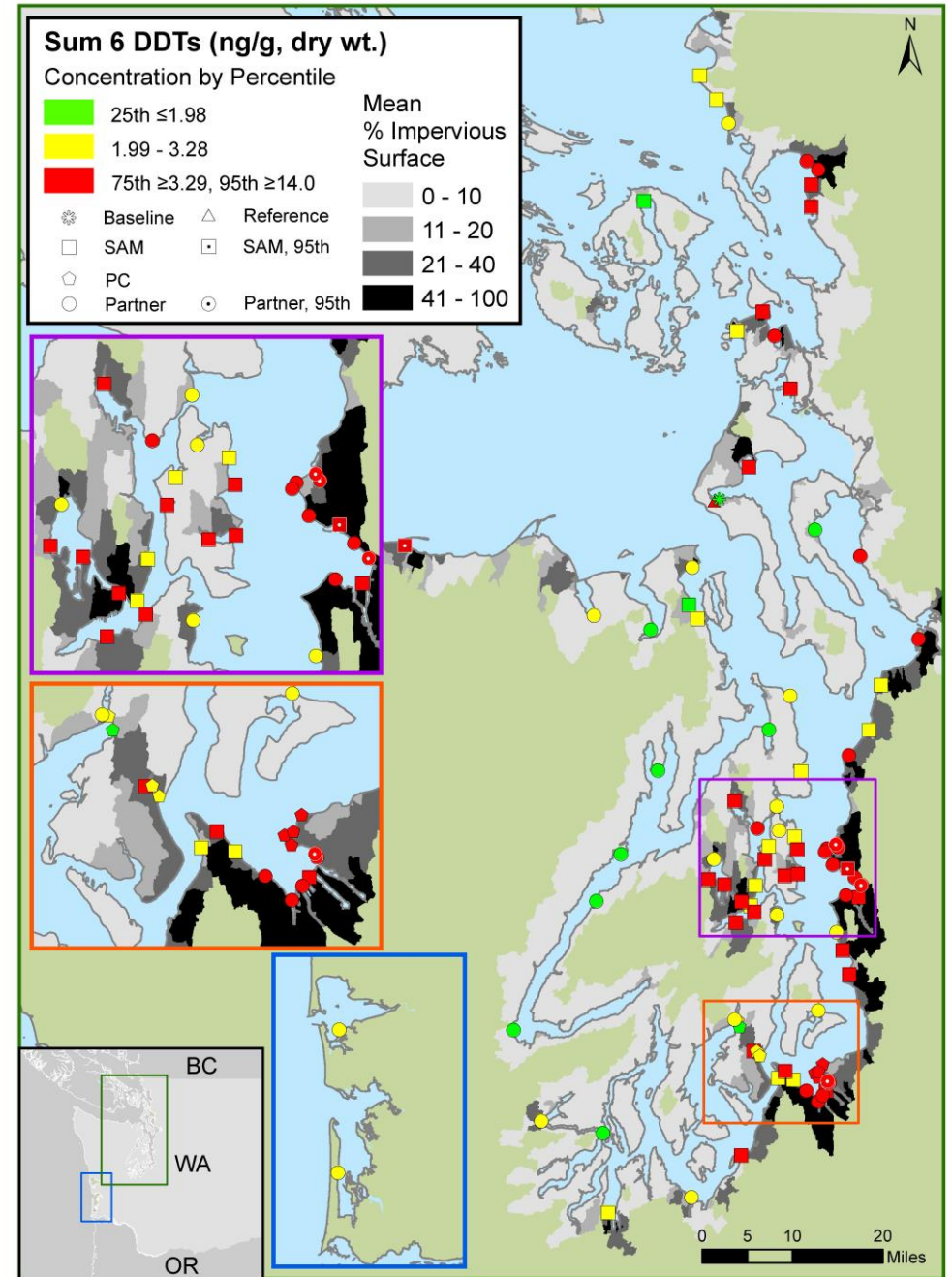
Intermediate: IQR, 1.99 – 3.28

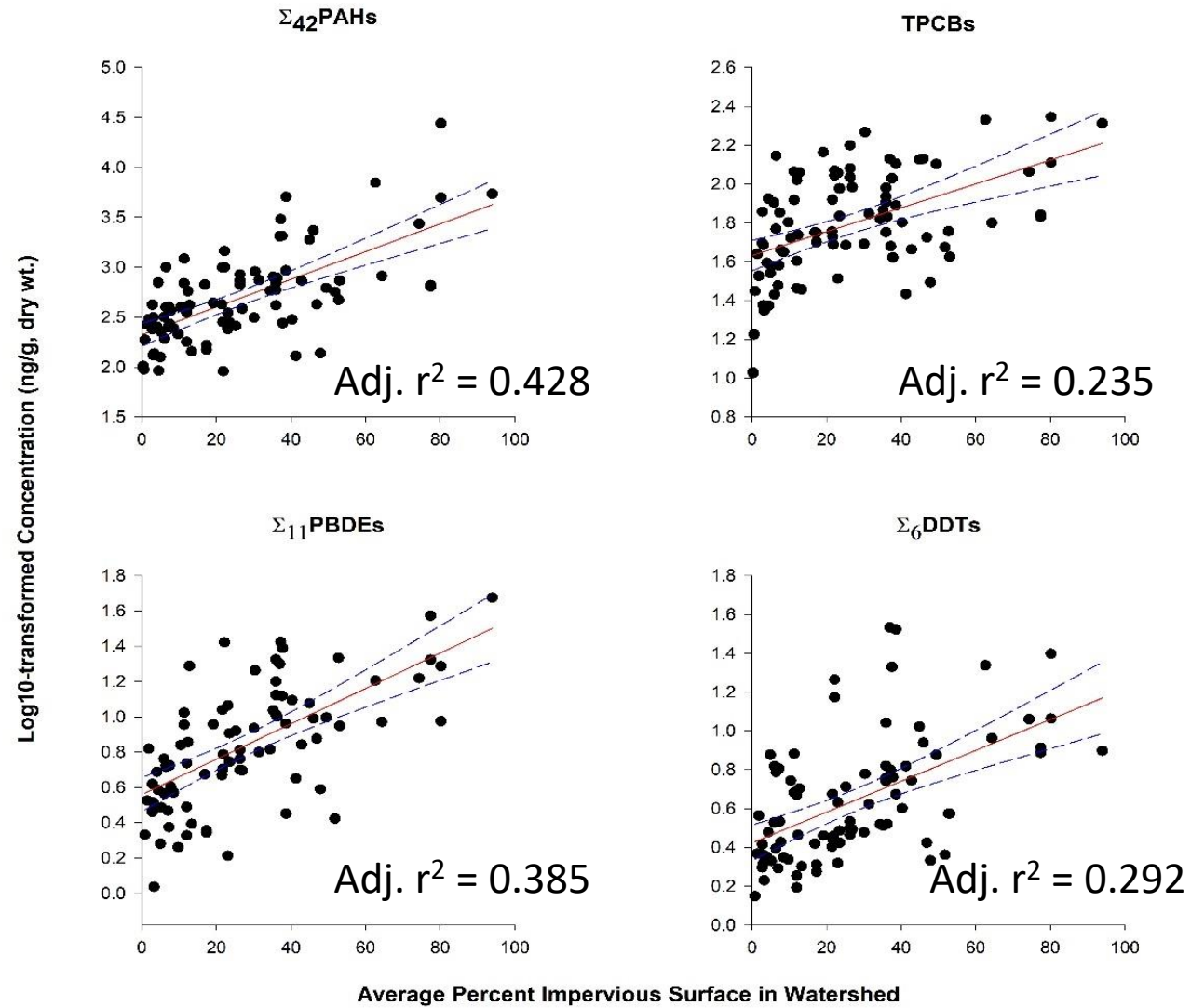
High: 75th Percentile, ≥ 3.29

Highest: 95th Percentile, ≥ 14.0

DDT concentrations highest in urbanized/industrialized south-central Puget Sound; Elliott Bay and Commencement Bay.

Also high at some locations in Whidbey and San Juan Basins, and near Port Angeles.

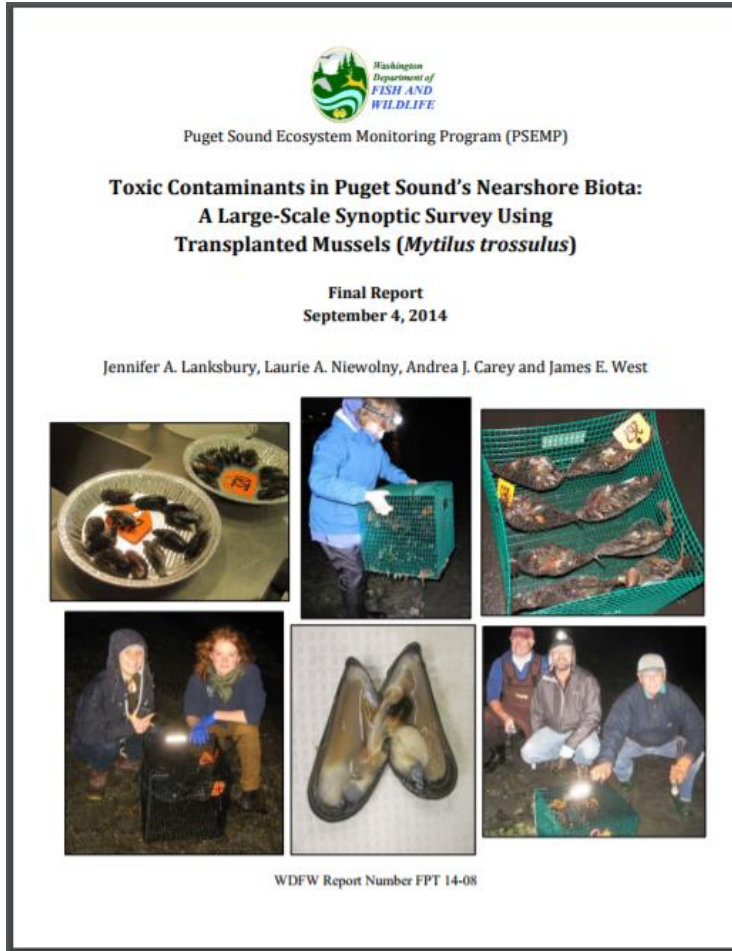






Conclusions

- PAHs , PCBs, PBDEs , and DDTs continue to be the most abundant organic contaminants detected in mussels of the Puget Sound nearshore.
- PCBs and DDTs in SAM site mussels had significantly higher median concentrations in this survey than in the 2015/16 survey, suggesting those contaminants should be closely monitored in future surveys to track whether there is an increasing trend.
- The CFD patterns for PAHs, PBDEs, and DDTs suggest that the majority of Puget Sound UGA shorelines have relatively low concentrations of these contaminants and that only a few sites have much higher concentrations, perhaps from site specific point sources. The CFD pattern for PCBs suggest sources of this contaminant is more widely dispersed within the Puget Sound UGAs.
- Sites with high organic contaminant concentrations were located mainly in the more urbanized south-central Puget Sound basin, while sites with low organic contaminant concentrations were mainly in the remote Hood Canal basin.
- Continued positive correlations between the concentration of key organic contaminants in mussels and the percent of impervious surface in adjacent watersheds is evidence that this characteristic of urbanization provides a transport pathway for toxic chemicals from terrestrial to aquatic habitats.

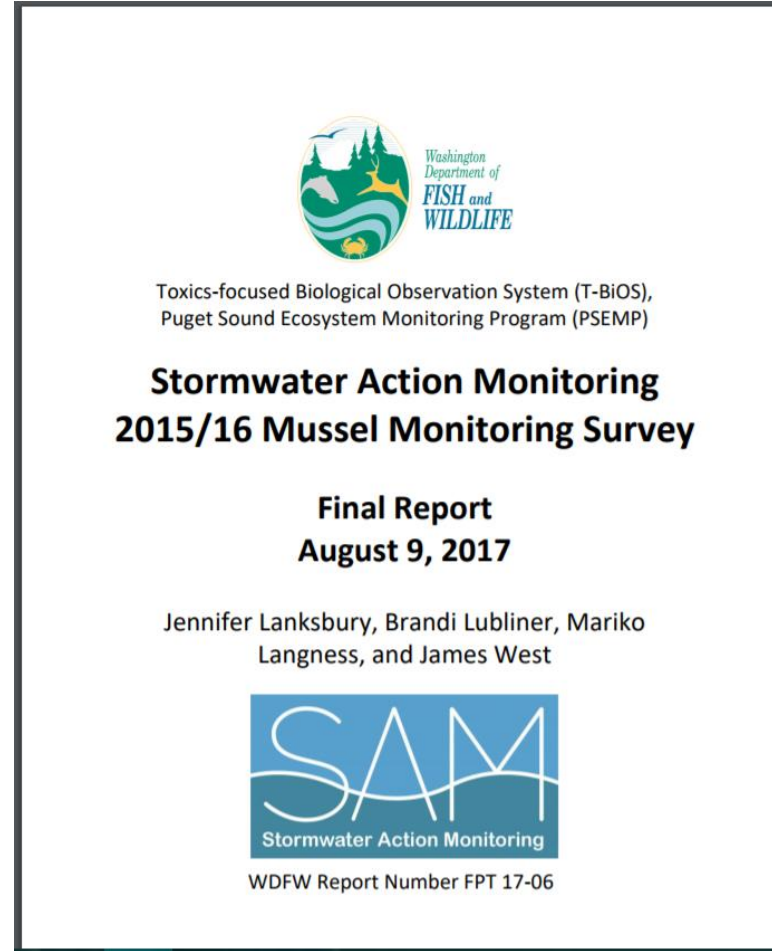
Reports now available online:






 Puget Sound Ecosystem Monitoring Program (PSEMP)
**Toxic Contaminants in Puget Sound's Nearshore Biota:
 A Large-Scale Synoptic Survey Using
 Transplanted Mussels (*Mytilus trossulus*)**
Final Report
September 4, 2014
 Jennifer A. Lanksbury, Laurie A. Niewolny, Andrea J. Carey and James E. West



WDFW Report Number FPT 14-08




 Toxics-focused Biological Observation System (T-BIOS),
 Puget Sound Ecosystem Monitoring Program (PSEMP)
**Stormwater Action Monitoring
 2015/16 Mussel Monitoring Survey**
Final Report
August 9, 2017
 Jennifer Lanksbury, Brandi Lubliner, Mariko
 Langness, and James West



WDFW Report Number FPT 17-06




 Toxics Biological Observation System (TBIOS),
 Puget Sound Ecosystem Monitoring Program (PSEMP)
**Stormwater Action Monitoring
 2017/18 Mussel Monitoring Survey**
Final Report
October 2020
 Mariko Langness and James West



WDFW Report Number FPT 20-13

Questions?

